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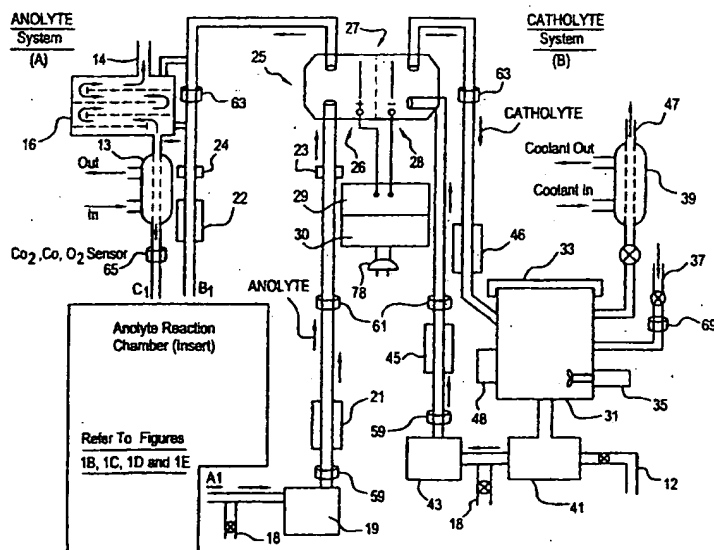
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(54) Title: MEDIATED ELECTROCHEMICAL OXIDATION OF INORGANIC MATERIALS



(57) Abstract: A mediated electrochemical oxidation process and apparatus for the use of mediated electrochemical oxidation (MEO) for the oxidation, conversion/recovery, and decontamination (such as cleaning equipment and containers, etc.) of all previously defined inorganic solid, liquid, and gases where higher oxidation states exist which includes, but is not limited to, halogenated inorganic compounds (except fluorinated), inorganic pesticides and herbicides, inorganic fertilizers, carbon residues, inorganic carbon compounds, mineral formations, mining tailings, inorganic salts, metals and metal compounds, etc.; and combined waste (e.g. a mixture of any of the foregoing with each other or other non-inorganic materials) henceforth collectively referred to as inorganic waste. The inorganic materials are introduced into an apparatus for contacting the inorganic materials with an electrolyte containing the oxidized form of one or more reversible redox couples, at least one of which is produced

electrochemically by anodic oxidation at the anode of an electrochemical cell. The oxidized forms of any other redox couples present are produced either by similar anodic oxidation or reaction with the oxidized form of other redox couples present and capable of affecting the required redox reaction. The oxidized species of the redox couples oxidize the inorganic waste molecules and are themselves converted to their reduced form, whereupon they are reoxidized by either of the aforementioned mechanisms and the redox cycle continues until all oxidizable waste species, including intermediate reaction products, have undergone the desired degree of oxidation. The entire process takes place at temperatures slightly above 0°C slightly below the boiling point of the electrolyte (which is normally 100°C), thereby avoiding the formation of either volatile inorganic or organic compounds. The oxidation process may be enhanced by the addition of reaction enhancements, such as: ultrasonic energy and/or ultraviolet radiation.



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